

# Curbside Consult

## What are the health hazards of snowboarding?

### INTRODUCTION

First introduced in the 1920s with little success, snowboarding is now one of the fastest growing winter sports in the world. In the 1999-2000 season, 3.3 million snowboarders contributed about 13.5 million visits to US ski resorts, representing 27% of total days on the snow. Many resorts now have special areas set aside just for snowboarding. These areas, called pipelines, are wide semicylindrical "shoots" carved out of snow. They are up to several hundred feet long with high vertical walls that allow snowboarders to ride from side to side. They are designed for "jumps and bumps" (aerial maneuvers and acrobatics). The typical snowboarder is a male adolescent, although the age range is widening and the proportion of female snowboarders is increasing.<sup>1</sup>

### HOW COMMON ARE INJURIES?

With the increasing popularity of snowboarding, injuries—the predominant health hazard associated with the sport—are seen more often than in the past. About 27,000 injuries related to the sport occurred in the United States in 1994. While most injuries are treated by health care personnel close to ski resorts, primary care physicians often provide follow-up care and can be instrumental in the primary prevention of injuries.

The reported injury rate varies from 3.5 per 1,000 snowboard days to more than 40 per 1,000 snowboard days.<sup>2,3</sup> Mortality rates are low (0.2 per million snowboarding days).<sup>1</sup> Recent cohort studies suggest that the rate<sup>4</sup> and severity<sup>3</sup> of injuries among snowboarders are higher than among alpine skiers of similar levels of ability. Forty-two percent of snowboard injuries, compared with only 16% of ski injuries, were considered emergent (defined as necessitating immediate medical intervention, including fractures, concussions with any loss of consciousness, dislocations,

and lost teeth). Concussions and wrist fractures accounted for most of the difference in emergent injuries between the 2 groups.<sup>3</sup>

### DIFFERENCES BETWEEN SKI AND SNOWBOARDING INJURIES

The different injury pattern between the 2 sports is related to differences in equipment and rider stance.<sup>5</sup> Snowboarders have both feet fixed to a single board, and arms, rather than poles, are used for balance. Therefore, the typical mechanism of snowboarding injury is a forward or backward fall broken by outstretched arms and hyperextended wrists. The sacrum and occiput are also common impact points. Other mechanisms of injury include collisions at speeds as high as 40 mph, attempts at aerial maneuvers, and difficulty getting on and off ski lifts.

### TYPES OF SNOWBOARDING INJURIES

Sprains and fractures are the most common injuries among snowboarders, followed by contusions, lacerations, dislocations, and concussions.<sup>6</sup> A high proportion of snowboarders who are injured are beginners. Novices are at increased risk for fractures and injuries to the wrist, in part because of frequent falls. Experts tend to have more ankle injuries, often associated with stunts and seeking "hospital air" (jumps that might result in injury requiring medical care).<sup>7</sup>

### Upper extremity injuries

Upper extremity injuries are more common than lower extremity injuries. Almost 20% of injuries and 50% of all fractures involve the wrist.<sup>5,6</sup> A wrist injury with point tenderness should be evaluated radiographically. Scaphoid, dorsal chip, and lunate fractures are common after falls on an outstretched hand. Because scaphoid and lunate fractures may be radiographically occult and may predispose the patient to avascular necrosis, careful evaluation is required and referral to an orthopedic surgeon should be considered.<sup>8</sup>

The shoulder is another common site for injury (see box).<sup>9</sup>

Elbow injuries, including fractures and

### Shoulder injuries associated with snowboarding<sup>9</sup>

- Dislocation
- Acromioclavicular separation
- Fracture of the clavicle
- Rotator cuff strain
- Fracture of the proximal humerus

dislocations, can occur in younger snowboarders. Steps in the management of this type of injury are recommended (see box below).

### Lower extremity injuries

Lower extremity injuries are becoming less common as the design of snowboard boots and bindings evolves. Knee injuries are less common and less severe among snowboarders than among alpine skiers, in part because the feet stay attached to the board during falls, placing less torque on the knees.<sup>11</sup>

The use of hybrid boots (soft outer shell with a stiff inner lining) significantly decreases the risk of ankle sprain.<sup>12</sup> However, fracture of the lateral process of the talus (LPT)—a rare injury in the general population—now accounts for 15% of all ankle injuries in snowboarders. The mechanism of injury in "snowboarder's fracture" is believed to be dorsiflexion of the ankle with inversion of the hind foot. This action may occur dur-

### Management of shoulder and elbow injuries associated with snowboarding<sup>7</sup>

- Refer to an orthopedist if fracture involves the growth plate (Salter-Harris type III or higher)
- Perform a neurovascular examination before and after reduction of a dislocation
- Assess reduction of dislocation radiographically
- Consider surgical stabilization of dislocations in young patients involved in collision sports<sup>10</sup>

ing a landing from an aerial maneuver or jump, especially when the landing is overrotated. Any snowboarder with acute or persistent anterolateral ankle pain, limitation of movement, or failure to respond to appropriate treatment should be evaluated for a talus fracture.

Fractures of the talus cannot be diagnosed on the basis of plain film radiography. Computed tomography is recommended when LPT fracture is suspected but plain film radiographs are normal, when the patient has persistent pain after apparent inversion ankle sprain, or to determine the size of fragments and extent of comminution of an LPT fracture identified radiographically.

Three patterns of LPT fractures occur: type 1 is an articular process chip fracture of the talus that does not extend to the talofibular articulation; type 2 is a single large fragment that may or may not be displaced, extending from the talofibular joint to the subtalar joint; type 3 is a comminuted fracture involving the entire lateral process.<sup>13</sup> Displaced or comminuted fractures require aggressive surgical intervention to avoid long-term sequelae, including osteoarthritis, nonunion, malalignment, and osseous overgrowth.<sup>12</sup>

## HEAD AND SPINAL INJURY

Although rare, the risk of head injury among snowboarders is twice that for skiers (6.5 per 100,000 visits vs 3.8 per 100,000 visits) and these head injuries tend to be more severe in snowboarders.<sup>14</sup> The risk for spinal injury, also rare, is 4 times higher than for skiers. The primary mechanism of spinal cord injury among snowboarders is jumping. Burst fractures are the most common type of fracture, followed by anterior compression fractures. Neurologic deficits occur in about 10% of patients.<sup>15</sup>

## YOUNG SNOWBOARDERS

The evaluation of injuries among young snowboarders requires recognition of several characteristics of the immature skeleton. Physeal fractures are more common than purely ligamentous injuries of the knee in this population group.<sup>16</sup> Nondisplaced physeal injuries may not be apparent radiographically because the physis is radiolucent. The thick periosteum in children may prevent early displacement of a complete fracture. Children are also more susceptible to elastic deformation because of the increased cartilage content in the immature skeleton.<sup>17</sup>

## Safety guidelines for snowboarders

- Get formal training in proper snowboarding techniques
- Pick the right time and place to learn (good weather, uncrowded slope, soft groomed snow)
- Wear protective gear (helmet, goggles, wrist guards)
- Wear insulated, waterproof, and layered clothing
- Protect exposed skin with sunscreen with high sun protection factor (SPF)
- Snowboard with a buddy trained in first aid and cardiopulmonary resuscitation
- Snowboard on patrolled areas, not on ungroomed trails or in wooded areas
- Preprogram your wireless telephone with the ski patrol phone number
- Be aware of your location at all times to guide rescue efforts if needed
- Don't use drugs or alcohol when snowboarding

## OTHER HEALTH HAZARDS OF SNOWBOARDING

Snowboarding is associated with other physical injuries and medical conditions. Injuries to the spleen can be sustained while snowboarding, particularly following a collision.<sup>18</sup>

Pulmonary air leaks can result from blunt chest trauma.<sup>19</sup> Pneumothorax should be suspected in any snowboarder with blunt chest trauma, no matter how severe, who complains of pleuritic chest pain and dyspnea. Athletes may downplay their symptoms and their high fitness level may compensate for serious intrathoracic injury for a period of time. A 10% increase in impact speed translates into a 40% increase in the risk of fatality for these types of injuries.

It is common for snowboarders to dress in street clothes rather than thermal ski wear. If injured off groomed trails where rescue efforts can be prolonged, snowboarders who are not properly outfitted are at particular risk for hypothermia. Snowboarders who fall headfirst into deep snow in remote areas may be unable to free themselves and are asphyxiated as a result.<sup>20</sup>

Myocardial infarction is a health risk among older snowboarders, and sunburn can be severe in all age groups.<sup>21</sup>



Courtesy of Copper Mountain Resort

The rate of injury is higher in snowboarders than in skiers

### Counseling techniques to reduce the risk of snowboarding injury

- Frame the counseling to match the patient's perspective. Ask how your patient feels about following safety guidelines and whether peer pressure influences his or her behavior.
- Fully inform patients of the purposes and expected effects of protective equipment. For example, wearing a helmet is likely to prevent head injuries but will not protect against spinal cord injury.
- Be specific. Outline the safety guidelines for snowboarders (see next box).
- Use the power of your professional authority. Be supportive of the sport and your patient's participation while providing firm, definite messages about the need to follow safety guidelines.
- Get an explicit commitment from your patient. Develop a contract that outlines what safety guidelines he or she will follow. Don't expect perfection; start with small changes and work up.
- Monitor progress through follow-up contact. A telephone call several weeks into the snowboarding season to review your patient's "safe snowboarding contract" provides positive reinforcement.

### RECOMMENDATIONS FOR SAFE SNOWBOARDING

Adolescents typically view themselves as invulnerable to injury and often exhibit risk-taking behavior. These characteristics contribute to the challenge of counseling

snowboarders about safe snowboarding practices and the need for protective equipment. Evidence about the efficacy of counseling in preventing recreational injuries to adolescents and young or middle-aged adults is limited, but counseling (see box) may improve the safety of snowboarders of all ages.<sup>22</sup>

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**Competing interests:** None declared

*West J Med* 2001;174:128-130

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